Theorem Suppose $\Delta = b^2 - 4ac < 0$.
The A.E. $ar^2 + br + c = 0$ has two complex roots $r = \alpha \pm i\beta$ where $\alpha = \frac{-b}{2a}$, $\beta = \frac{\sqrt{4ac-b^2}}{2a}$.
The DE

$$ay'' + by' + cy = 0$$

has two linearly independent solns

$$y_1 = e^{\alpha t}\cos\beta t, \qquad y_2 = e^{\alpha t}\sin\beta t$$

and the general soln is given by

$$y = e^{\alpha t}(C_1\cos\beta t + C_2\sin\beta t),$$

where C_1, C_2 are any constants.